

EXECUTIVE SUMMARY

For centuries, humans have depended on inlets as a means of navigating between the ocean and the protected coastal waters behind barrier islands. Inlets along the North Carolina Outer Banks barrier islands offered access to the first English settlers in the New World during the late 16th century, and continue to offer access for commercial and recreational vessels. Although promising passage to sheltered waters, the dynamic, shifting sands of the inlet shoals have led to the grounding and destruction of numerous vessels, contributing to the infamous label “graveyard of the Atlantic” for the North Carolina coast. With time, some inlets provided access to port towns which became locations for trade, and which would provide a local pilot to help navigate ships through the shifting channels. Thus, inlets became an important economic asset. Today, inlets are still vital to navigation, trade, and commerce, especially commercial and recreational fishing.

In addition to their clear historical and economic significance, inlets provide a vital service to the maintenance of estuaries and barrier islands, and play a fundamental role in the evolution of transgressive (landward migrating) barrier islands. In spite of their name, inlets could more appropriately be termed “outlets” as they provide an exit for fresh water flowing down the rivers. Within the estuaries, the fresh riverine water mixes

with salty ocean water to produce the mixed salinity or brackish waters. The riverine flow volumes and ocean storm dynamics determine the residence time of water within the estuaries, which is important to biological systems.

Inlets also provide a pathway for sand to be transferred from the shorezone on the ocean-side of the island to the estuarine side of the island. The sand is deposited as vast flood-tide deltas which are colonized by marsh plants upon inlet closure. The resulting back-barrier shoals and marshes maintain island width, and provide a shallow platform over which the island may migrate landward. The occurrence of inlet channel sediments and flood-tide delta sediments beneath the barrier islands affects the variety of sediment available to the beach system as the ocean shoreline recedes. As such, island, beach, and shoreface morphologies are related to the occurrence of paleo-inlet channels beneath the islands. In turn, the island geomorphology is a key factor in determining where future inlets are most likely to occur. Thus, it is important to understand the dynamics of past inlets and their relationship to the sediment budget and island geomorphology. Inlets are vital to the short-term maintenance of barrier island systems and their estuaries, and long-term barrier island evolution in response to ongoing sea-level rise.